



# Workshop for Proposed EPIC 2015-2017 Triennial Plans



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**California Public Utilities Commission**

Thursday, July 31, 2014



# Agenda

- Introduction and Overview
- Panel Discussion: Nature and Importance of R&D
- Overview of 2015-2017 Investment Plans
- Discussion of Scoping Questions





# What is EPIC?

- ✓ A coordinated effort to bring technology frontiers closer for ratepayer benefit
- ✓ A bridge over gaps between the status quo and California's policy goals
- ✓ A \$162 million annual program established by Commission Decisions D.11-12-035 and 12-05-037





# EPIC Goals

- Provide ratepayer benefits: Reliability, safety, and lower costs
- Advance pre-commercial innovations and provide market facilitation for commercial-stage ones





# Program Design and Research Areas

## APPLIED RESEARCH AND DEVELOPMENT

Focuses on validating new ideas and technologies

## TECHNOLOGY DEMONSTRATION AND DEPLOYMENT

Demonstrates strategies at real-world scales

## MARKET FACILITATION

Overcomes non-technical hurdles to increase market adoption and expansion of emerging solutions

Image: California Energy Commission





# EPIC Tracks & Timelines

2012-2014  
Investment  
Plans

(EXTENSIVE  
PUBLIC  
INPUT)

Approved  
11/2013 (D.13-11-  
025)

Administrators  
implementing  
(solicitations,  
scoping and  
selecting projects)

2015-2017  
Investment  
Plans

Applications  
submitted 5/2014  
(A.14-04-034 et  
al)

Commission  
proceeding to  
review





# Panel Discussion: The Nature and Importance of RD&D

- *George Simons, Itron*  
The nature and unique challenges of administering research programs
- *Dr. Craig R. Horne, EnerVault*  
The role these programs play in accelerating market and utility adoption of innovations



# NATURE AND IMPORTANCE OF RD&D

Energy Division Workshop for Proposed Electric Program  
Investment Charge 2015-2017 Triennial Plans

CPUC

July 31, 2014

George Simons, Director

# IMPORTANCE OF RD&D



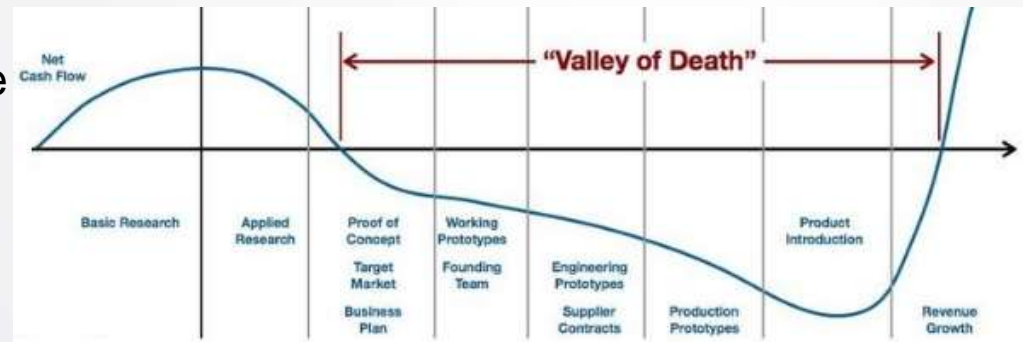
Salk: 1947-1953  
Sabine: post 1957



1800 – 1835: development of electric lights  
1981: 1<sup>st</sup> CFLs  
1995: LEDs emerge

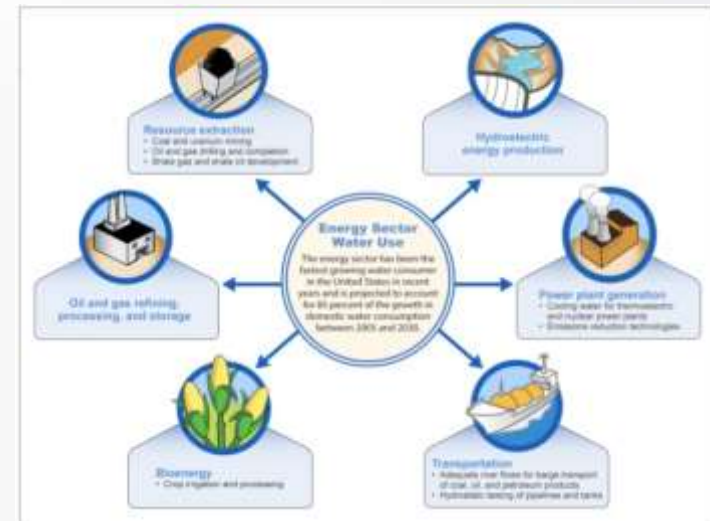
## □ EPIC

- Focus on *public* benefits in the electricity arena
- Combination of near and longer term research
- Different expectations of success and metrics of success

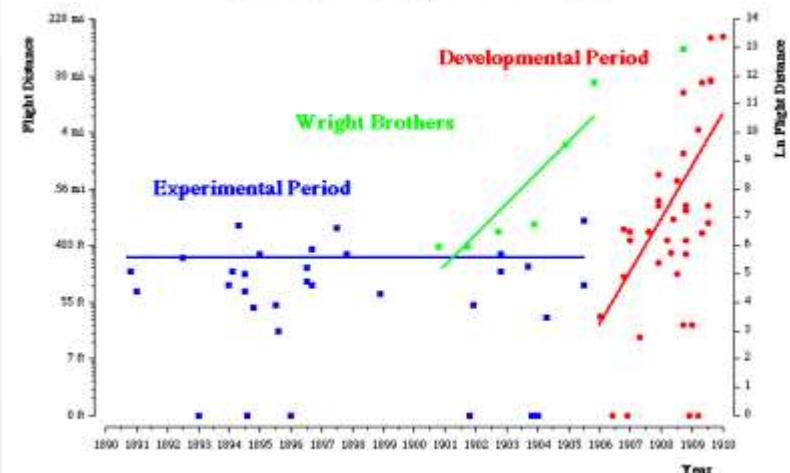


# CHALLENGES

- ❑ Complexity of EPIC RD&D
  - Many moving pieces; interdependencies
- ❑ Clear goals and metrics
  - Easy to over prescribe approaches
- ❑ Research is messy
  - Most R&D attempts fail
  - Often iterative (flight)
- ❑ Need to be timely
  - The process trap
- ❑ Flexibility
  - Discovery of solutions
  - Landscape changes

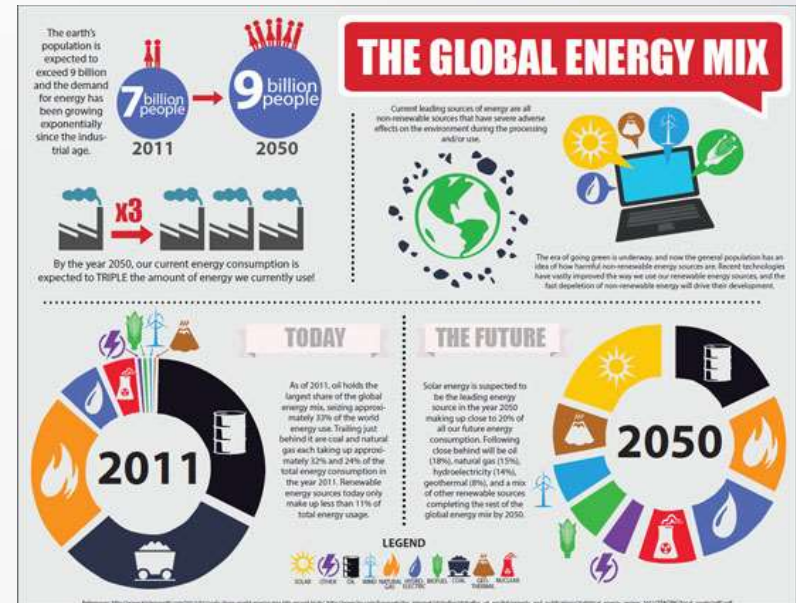


Attempts at Flight 1890 - 1909



# LESSONS LEARNED

- ❑ Set expectations early
  - Avoids overcommitting
  - Metrics for progress
- ❑ Employ flexibility
  - Best ideas are not necessarily ones on the radar
  - R&D is more than widgets
- ❑ Target for results
  - Manage projects; not contracts
  - Successful projects are partnerships
- ❑ Maintain timeliness
  - Limited amount of time to affect change
  - 80% and moving vs 100% and frozen
- ❑ Think big





## Company Overview

*Craig R Horne*

*Chief Strategy Officer & Co-Founder*

*choRne@enervault.com*

**July 31, 2014**



# COMPANY OVERVIEW

## Focus:

*Long-duration, grid-scale energy storage...*

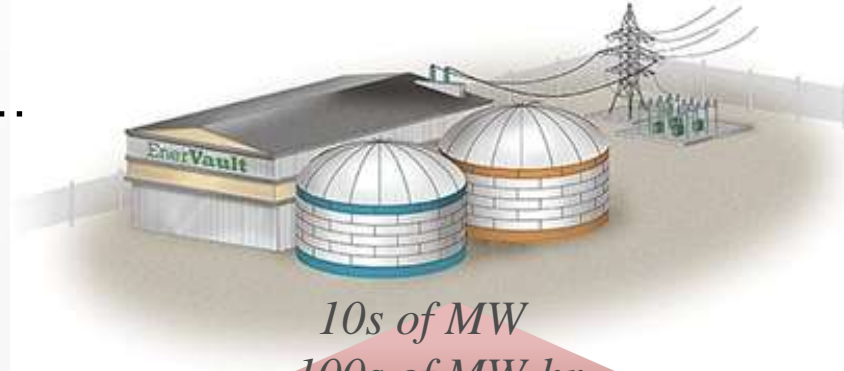
## Benefits:

Flexible, CO<sub>2</sub>-free local capacity

Unparalleled safety, reliability, and low CapEx

Configurable & scalable design minimizes costs

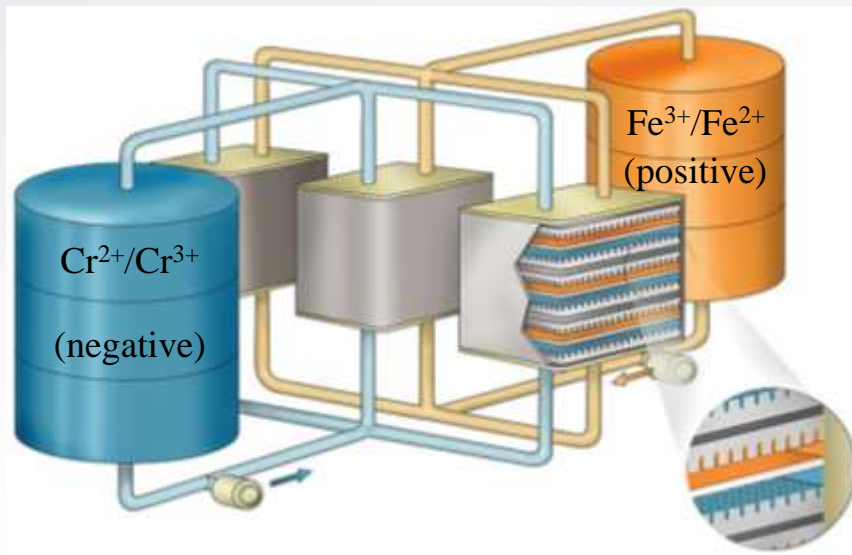
**EnerVault**  
Safe, Reliable, Cost-Effective Energy Storage



10s of MW

100s of MW-hr

250 kW<sub>AC</sub>  
4 hour



# ENERGY STORAGE DRIVERS & BENEFITS

## »Decarbonize Grid/Increase Resiliency

- ⊙ Rising fossil fuel costs
- ⊙ Intolerable environmental impacts from fossil fuel
- ⊙ Cost effectiveness of PV and wind
- ⊙ Differences between peak and base load
- ⊙ Transmission & distribution constraints
- ⊙ Increase value of energy security

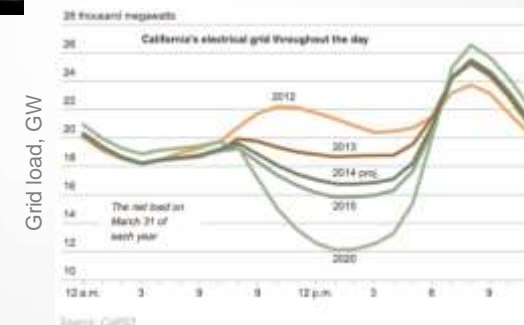
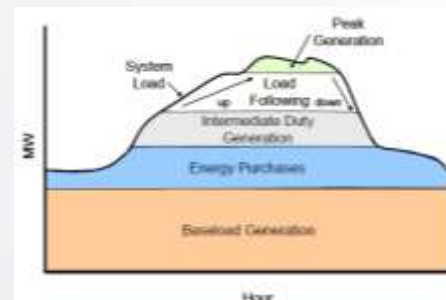
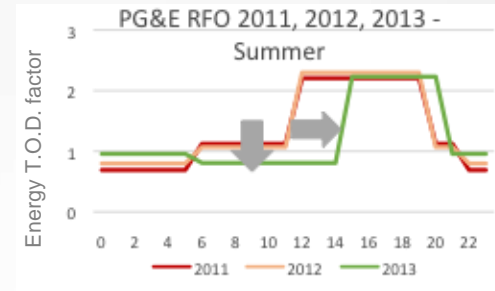


Mark Hoffman/Milwaukee Journal Sentinel



## »Lower Energy Costs/Greater Reliability

- ⊙ Enables peak demand management
- ⊙ Avoids costly transmission and distribution projects over sensitive areas
- ⊙ Provides backup
- ⊙ Delivers clean peak electricity
- ⊙ Improved grid efficiency



# DELIVERED FE/CR TECHNOLOGY TO THE FIELD

- Applied RD&D**
- augment private investment
  - incentivizes entrepreneurs

**2010**



*2 kW/1 hr Lab-Scale Test Unit*

**2012**



*30 kW Pilot System*

**10X**

**2014**



*250 kW<sub>AC</sub>/1 MW-hr  
Turlock Field System*

- Technology Demo & Deploy**
- maintains momentum
  - lowers risk perception

**10X**

# ENERVAULT MW-HR FIELD U



ARRA Storage  
Demonstration Program



“Redox flow batteries may hold great potential for replacing gas-fired peaking power plants, and for providing badly needed grid stabilization services.”

Peter Kelly-Detwiler, Forbes



see highlights at:

<http://enervault.com/enervault-turlock-dedication>

# BRINGING FE/CR SYSTEMS TO MARKET

*2014*

*Demonstrate 250 kW<sub>AC</sub>  
1 MW-hr Field System*



*2015*

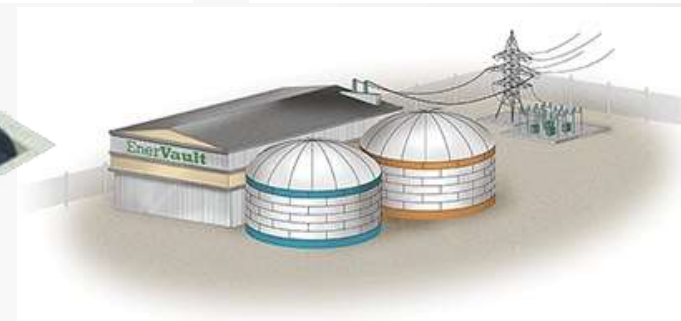
*Deliver 1-2 MW<sub>AC</sub>  
IS Systems*



*2016*

*2017*

*Launch 10+ MW<sub>AC</sub>  
GS Systems*



*3<sup>rd</sup> party certification*

*upscale & optimize*

*bankability*

*integration*

**Technology Demo & Deploy**

- bridges last gap
- establish sales pipeline

# PERSPECTIVES

## ⊙ Timing

- solicitation to award is critical !
- no more than 6 months

## ⊙ IP

- licences & ROFRs can handcuff start-ups, limit options
- no entanglements for crucial IP

## ⊙ Award Size

- grid systems are (typically) about scale: MW/unit or  $\Sigma$  MW

## ⊙ Focus

- market driven, use-case based objectives



# Overview of 2015-2017 Plans



# **Workshop for Proposed EPIC 2015- 2017 Triennial Plans**

## **Investor Owned Utility Programs**

**July 31, 2014**

# Continuous Collaboration on the Development & Implementation of EPIC

- Starting June 2012, the program administrators have generally met at least biweekly to discuss EPIC and their respective objectives for the program
- This collaboration resulted in the development of a common EPIC Framework to guide the individual EPIC plans and provide for meaningful discussion amongst the IOUs
- The Joint IOU EPIC Framework has been presented to stakeholders in a variety of public forums, as well as to the CEC, CPUC Staff and industry experts (including the Electric Power Research Institute) in an effort to seek input and avoid duplication
- These groups have validated that the Working IOU EPIC Framework correctly identifies current technology gaps and aligns with driving California policies and goals
- Importantly, the CPUC approved the common framework as part of each of the IOU EPIC Investment Plans in Decision 13-11-025

# Investor Owned Utility EPIC Framework

	Safety	Affordability	Reliability	Key Drivers & Policies
<b>Cross Cutting/Foundational Strategies &amp; Technologies</b> Smart Grid Architecture, CyberSecurity, Telecommunications, Standards	<b>Renewables and Distributed Energy Resources Integration</b> <ul style="list-style-type: none"> <li>• Demonstrate Strategies &amp; Technologies to Increase Renewable Resources on the Grid</li> <li>• Adaptive Protection Strategies</li> <li>• Demonstrate Grid-Scale Storage Strategies &amp; Technologies</li> </ul>			<ul style="list-style-type: none"> <li>• 33% RPS</li> <li>• CSI</li> <li>• Gov's 12,000 MW DG Plan</li> <li>• OTC retirements</li> <li>• AB32</li> <li>• Storage Mandate</li> </ul>
	<b>Grid Modernization and Optimization</b> <ul style="list-style-type: none"> <li>• Demonstrate Strategies and Technologies to Optimize Existing Assets</li> <li>• Prepare for Emerging Technologies</li> <li>• Design and Demonstrate Grid Operations of the Future</li> </ul>			<ul style="list-style-type: none"> <li>• SB17</li> <li>• Aging Infrastructure</li> <li>• Workforce Development</li> <li>• CA Economic Resiliency</li> </ul>
	<b>Customer Focused Products and Services Enablement</b> <ul style="list-style-type: none"> <li>• Leverage the SmartMeter Platform to Drive Customer Service Excellence</li> <li>• Provide Greater Billing Flexibility &amp; Visibility</li> <li>• Integrate Demand Side Management for Grid Optimization</li> </ul>			<ul style="list-style-type: none"> <li>• ZNE</li> <li>• CSI</li> <li>• Net Energy Metering</li> <li>• Peak Reduction</li> <li>• Electric Transportation</li> </ul>

# CPUC Recognizes the Need for Flexibility

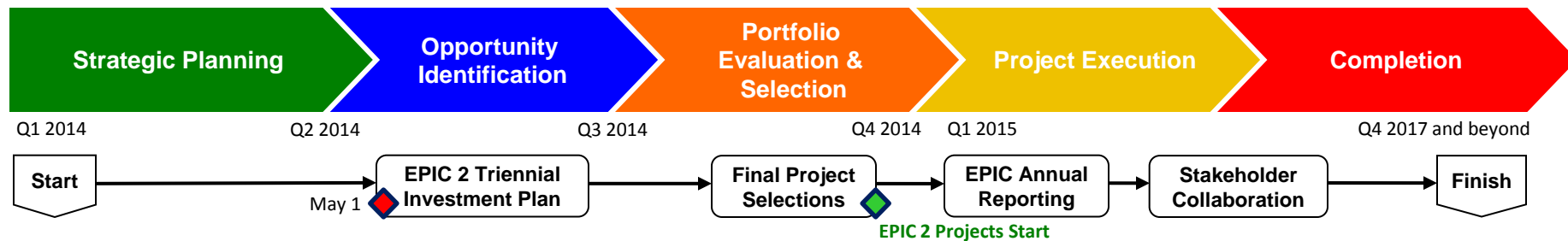
## Fund Shifting

- The CEC, PG&E, SCE, and SDG&E may shift funds within a funding category/program area without limitation. (D.13-11-025, OP37, at p. 142)
- Administrators may shift funds within a funding category/program area without limitation because Administrators need the flexibility to efficiently administer authorized proposals within a funding category/program area. (D.13-11-025, p. 100)
- The administrators believe that the need for flexibility, emphasized by the Commission in its decision, allows EPIC PAs to:
  - Refocus and/or re-scope projects,
  - Terminate/off-ramp projects,
  - Perform additional pilots and/or demonstrations in order to sufficiently assess operational and performance characteristics.
  - During the three year cycle, changes may occur that encourage the addition of projects not proposed in the Investment Plan.

## Stakeholder Engagement

- Administrators shall consult with stakeholders no less than twice a year, both during the development of each investment plan and its execution. (D.12-05-037, OP15, p. 105)

# Portfolio Management Lifecycle



## Strategic Planning

- Review near, medium, & long-term grid challenges
- Establish EPIC 2015-2017 investment planning priorities
- Consult with external stakeholders to review & confirm strategy

## Opportunity Identification

- Subject matter experts develop EPIC proposals for consideration
- Review against in-flight EPIC 1 projects; alignment with EPIC primary & secondary principles; PUC Code 740.1, PUC 8630
- Assess against other initiatives to avoid duplication

## Portfolio Evaluation & Selection

- Detailed evaluation & scoring by stakeholders & SMEs
- Scoring: Alignment with state/federal policy drivers, business priorities/strategy, technology maturity and potential benefits
- Highest scoring projects presented to Leadership/Executive Steering Committee for final approval

## Project Execution

- Detailed project planning for approved projects including scope, schedule, resourcing & budget
- Best-practice program governance monitors & controls projects including regularly project performance & risk/issues review
- Project status reported in EPIC Annual Report

## Completion

- EPIC project outcomes and findings inform future capital & program investment decisions
- Viable projects proposed for deployment via separate applications (e.g. GRC)
- Project closeout includes final project report developed per EPIC requirements



# Electric Program Investment Charge

## Second Triennial Investment Plan 2015-2017

Energy Division Workshop  
Proposed Electric Program Investment  
July 31, 2014

Energy Research and Development Division  
California Energy Commission



## Discussion Topics

- Basis of funding initiatives in the 2<sup>nd</sup> Investment Plan
- Collaboration efforts to avoid duplication
- Nature of research
- Comparison matrix
- Relationship of 1<sup>st</sup> plan to 2<sup>nd</sup> plan
- Snapshots: Leverage and Examples



## Basis of Proposed Funding Initiatives in the 2<sup>nd</sup> Investment Plan

- CPUC Decision and framework
- Greatest potential value proposition for ratepayers
- SB 96 (2013) and other relevant energy statutes and policies
- Stakeholder comments received
- Coordination with IOUs and others
- Current knowledge of state-of-the-art technologies
- Key factors driving clean energy development



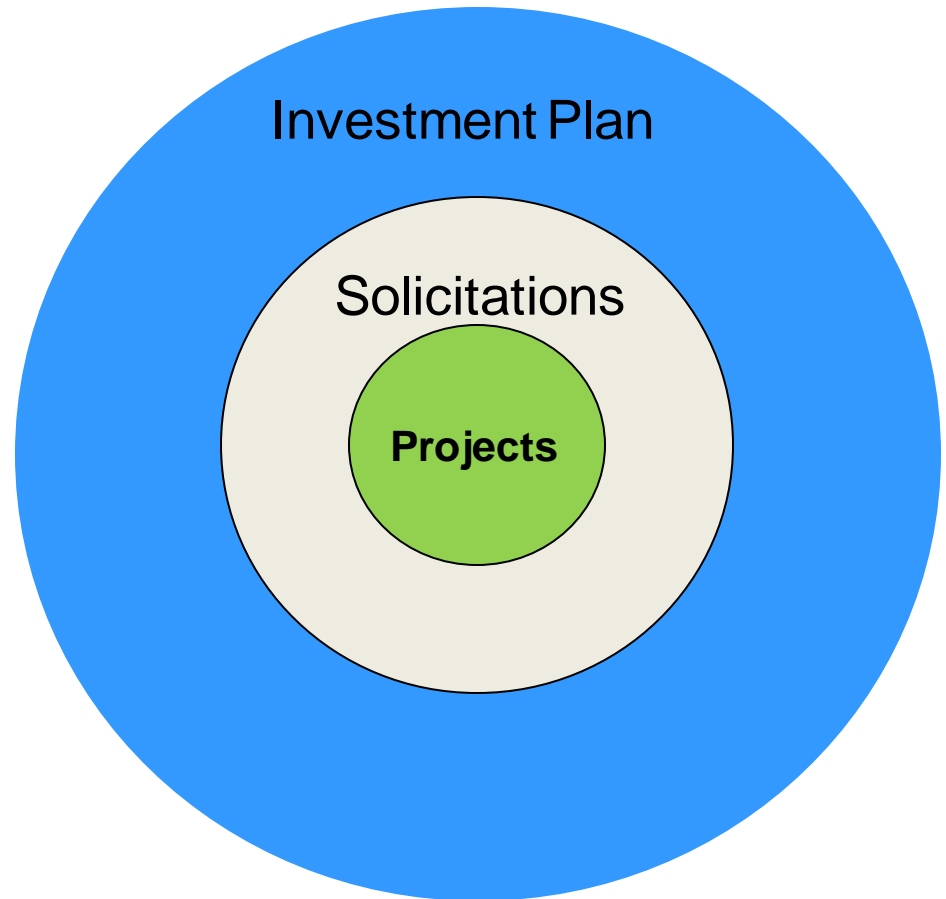
## Collaboration Efforts to Maximize Efficient Use of Funds and Avoid Unnecessary Duplication

- Work together with IOUs and other stakeholders to address common goals
- Share information regarding EPIC investment plans, programs and projects
- Disseminate results of program efforts
- Administrators conduct at least bi-weekly conference calls and meet periodically to coordinate investment plans and ensure funding initiatives are complementary
- Share annual reports
- Participate in public workshops, solicit and respond to comments and advice from stakeholders



## Other Measures to Avoid Duplication

- **Staff Remains Current on Research Activities**
  - Update research roadmaps
  - Coordinate and conduct public workshops or surveys
  - Conduct and participate in technical advisory committees with other experts
- **Solicitations are Targeted**
  - Projects are evaluated by technical staff and experts
  - Evaluation criteria include:
    - ✓ how the project will lead to technological advancements and breakthroughs
    - ✓ current status of the technology
    - ✓ how proposed project will advance and/or replace current technology
    - ✓ need for EPIC funding and why the proposed work is not adequately supported by current markets



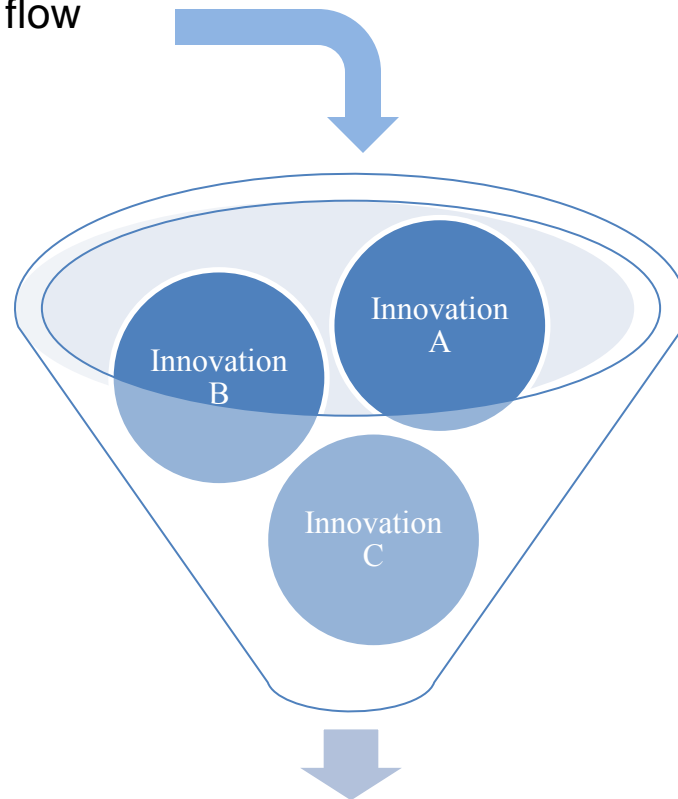
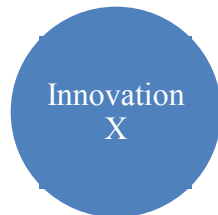
**Annual Reports Distributed to Stakeholders to further to avoid duplication**



# The Energy Innovation Pipeline Operates Like a Funnel

New ideas and innovations flow  
into the pipeline

Some of these  
innovations will fall out  
of the pipeline for  
various reasons



Best innovations come out of the pipeline in the form of  
new or improved products that exceed the performance  
of current commercial offerings.



## Nature of Research: Concept Development to Deployment High Solids Anaerobic Digestion Technology

Multiple projects to design, test, and evaluate commercial scale systems for conversion of food and other organic wastes.

Applied Research & Development  
Digester Conversion Concept  
Development and Laboratory Tests  
(0.5 – 6 gallons)

Technology Demonstrations & Deployment  
(>300,000 gallons)

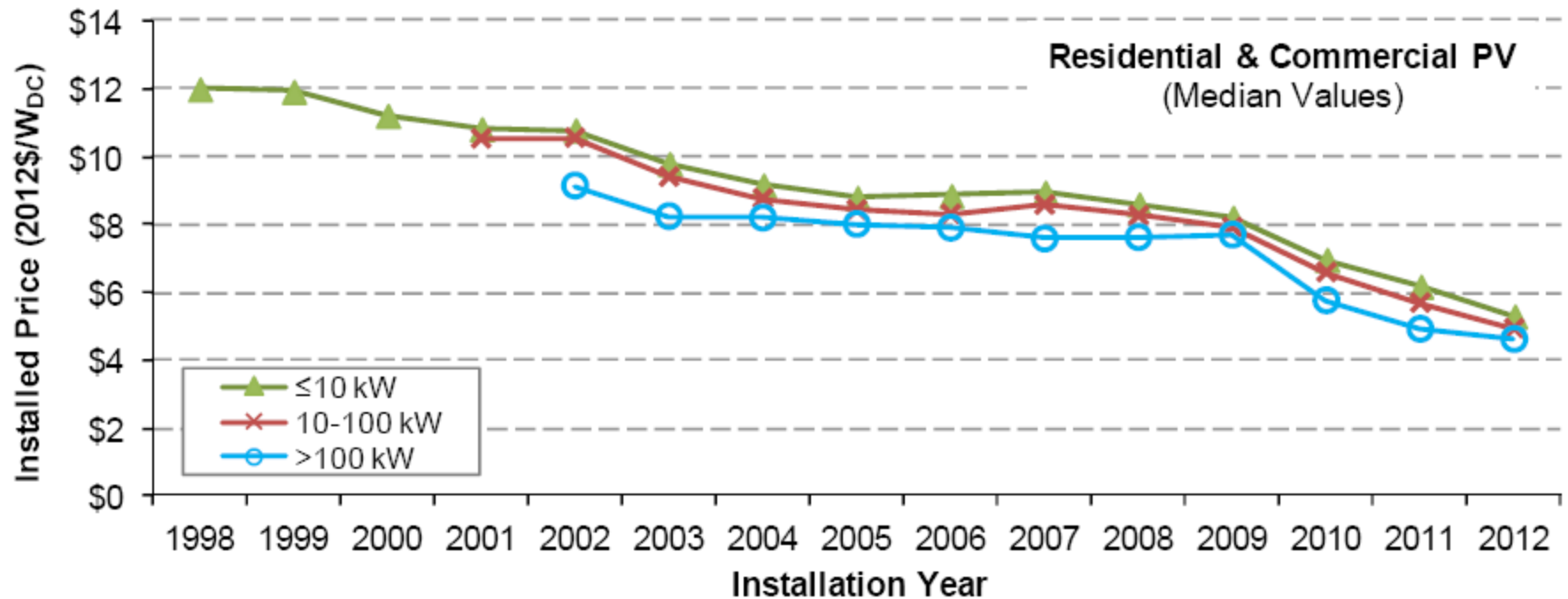
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

Applied Research & Development  
Digester Conversion Process Scale-Up,  
Pilot Development and Tests  
(50,000 gallons)

Multi-year project including 3 ton/day pilot facility design, construction, and demonstration, and economic/environmental performance analysis



## Sustained Investments in Photovoltaics Have Resulted in Technological Improvements and Significant Cost Reductions





## Comparison Matrix of Administrator's EPIC Investment Plans

- Provide information, as directed by Administrative Law Judge David Gamson on June 23, 2014, on each of the Program Administrators' respective EPIC investment plans
- Prepared with guidance from staff of the Commission's Energy Division
- Shared with staff from the Office of Ratepayer Advocates
- Prepared jointly by all four administrators
- Submitted on July 28, 2014



## Categories in Comparison Matrix of Administrator's EPIC Investment Plans

- IOU project or CEC initiative
- Page number in the EPIC investment plan where information is found
- Name of administrator proposing the project or initiative
- Applicable EPIC investment plan area or pipeline phase
- Applicable value chain category
- Scope and focus of the project or initiative
- Policy drivers and justification
- Applicable coordination with Commission proceedings or legislation
- How project or initiative avoids duplication
- Preliminary budget for groups of projects or initiatives



## CEC Priorities for Applied Research

- **Energy Efficiency and Demand Response:** Develop new or improve existing technologies; zero net energy (ZNE) and existing models and strategies, behavioral research, indoor air quality, industrial agriculture and water, water efficiency in buildings and develop and expand demand response capabilities
- **Renewables:** Develop new or improve existing technologies (biomass, photovoltaic, geothermal, wind; hydrokinetic power; piezoelectric, forecasting techniques)
- **Environmental:** Develop roadmap on public health impacts from energy technologies; environmental tools related to energy generation; small grant program for environmental projects
- **Transportation:** Develop electric vehicle (EV) charging and grid support; advance vehicle to grid integration; technologies for EV battery recycling
- **Smart Grid:** Develop smart inverter capabilities, open source electricity system modeling tools and customer energy management systems
- **Cross cutting:** small grants program for early stage projects; incentivized competitions for breakthrough ideas; cost share for federal grants



## CEC Priorities for Technology Demonstration and Deployment

- **Energy Efficiency and Demand Response:**  
Large scale demonstration of technologies or integrated suite of energy efficiency and DR technologies
- **Renewables:**  
Demonstration of bioenergy production for woody biomass; demonstration of digester technologies for various feedstocks
- **Smart Grid:**  
Demonstrations of microgrids as testing tools; advanced energy storage and EVs to provide advanced grid services
- **Cross cutting:**  
Cost share for federal grants



## CEC Priorities for Market Facilitation

- Commercialization assistance and market analysis
- Support for entrepreneurs and consumers
- Local government planning and permit streamlining
- Conduct gap analyses, roadmaps and strategies for electricity system
- Measure and verify ratepayer benefits

Providing Value to Customers through Market Acceleration



## Snapshot of How the 2<sup>nd</sup> Plan Leverages the 1<sup>st</sup> Plan for Energy Efficiency

Issue	1st Plan	2nd Plan
<b>Applied Research and Development:</b>	<b>S1</b>	<b>S1</b>
<ul style="list-style-type: none"> <li>Challenge to meet State energy efficiency/GHG reduction goals</li> <li>Advanced technologies are costly and savings/ benefits uncertain</li> <li>Technologies and strategies need to be accepted by consumers, builders and developers</li> </ul>	<ul style="list-style-type: none"> <li>Develop and test advance technologies and strategies</li> <li>Evaluate ZNE and existing building strategies (e.g., direct current for ZNE)</li> <li>Address data gaps</li> <li>Lay foundation for future large scale deployments</li> </ul>	<ul style="list-style-type: none"> <li>Continue funding for new technologies and strategies not funded in the 1st plan</li> <li>Address data gaps to inform future building and appliance code changes</li> <li>Continue to develop and test strategies for ZNE and existing buildings</li> <li>New areas involve IAW and water efficiency in buildings</li> </ul>
<b>Technology Demonstration and Deployment</b>	<b>S12, S14.1</b>	<b>S12</b>
<ul style="list-style-type: none"> <li>Need for independent verification</li> <li>Resolve regulatory barriers</li> <li>Calculate life cycle economics</li> <li>Private sector interested after successful field demos</li> </ul>	<ul style="list-style-type: none"> <li>Focused on industrial, agriculture and water (IAW) technology demonstrations</li> <li>Integrated demonstrations of low energy buildings/facilities including energy efficiency , storage, demand response (DR)</li> <li>Large scale demo of technologies and strategies for ZNE buildings and communities</li> </ul>	<ul style="list-style-type: none"> <li>Emphasize large scale deployment of technologies (from previous PIER program/EPIC/or others)</li> <li>Continue to develop and test integrated strategies with demand side management /DR for ZNE and existing buildings –large scale deployment</li> <li>Integration of behavioral research into deployment phases</li> <li>No IAW demos in 2<sup>nd</sup> Plan</li> </ul>



## Snapshot of Policy Connection and Coordination for Water Initiative

CEC Initiative (S1.6): Advance Strategies to Reduce the Impact of California Buildings on the Water-Energy Nexus	CPUC and Other Related Policy Activities	Coordination to Avoid Duplication
<b>Increase efficiency of end use devices</b> <ul style="list-style-type: none"> <li>• advanced, pre-commercial technologies and strategies</li> <li>• include energy nexus projects</li> <li>• Use CPUC methodology for determining ratepayer benefit for Water Energy Nexus</li> </ul>	<ul style="list-style-type: none"> <li>• CPUC-Water Energy Nexus Proceeding - methodology for determining energy ratepayer benefits</li> <li>• IOU: water energy pilots (water heaters)</li> <li>• CEC Codes and Standards and past research</li> <li>• WET CAT (Water Energy Technology Climate Action Team)</li> </ul>	<ul style="list-style-type: none"> <li>• Maintains awareness of similar activities; conducts internet searches, participates in technical advisory meetings and discusses research need</li> <li>• IOU/POU ET Programs continue to coordinate to ensure no overlap and share results</li> <li>• Coordinate w/CEC Codes and Standards</li> <li>• Participate in WET CAT and coordinate and discuss opportunities and research needs with other state agencies</li> </ul>
<b>Increase use of gray water</b> <ul style="list-style-type: none"> <li>• heat recovery</li> <li>• landscape irrigation</li> </ul>	Same as above	Same as above.
<b>Identify leakage and waste through use of smart water meters and controls</b> <ul style="list-style-type: none"> <li>• advanced, pre commercial tech to improve and reduce the cost of current detection methods</li> </ul>	Same as above	Same as above



# Snapshot of How the 2<sup>nd</sup> Plan Leverages the 1<sup>st</sup> Plan for Electric Vehicles

Issue	1st Plan	2nd Plan
<b>Applied Research and Development</b>	<b>S9</b>	<b>S9</b>
<ul style="list-style-type: none"><li>• Determine how plug-in electric vehicles (PEVs) can be efficiently integrated into the electricity grid</li><li>• Advance technologies for safe and cost-effective recycling of PEV batteries</li><li>• Need for wider adoption that expands beyond govt fleets.</li></ul>	<ul style="list-style-type: none"><li>• Develop and test vehicle to grid communication interfaces, distributed storage</li></ul>	<ul style="list-style-type: none"><li>• Research on battery recycling, PEV charging to support grid stability and vehicle to grid integration</li><li>• Address additional technological barriers and challenges not addressed in the first plan</li></ul>
<b>Technology Demonstration and Deployment:</b>	<b>S14.3</b>	<b>S16</b>
<ul style="list-style-type: none"><li>• PEVs not economically proven at large scale</li><li>• Lack of research on the feasibility and benefits of advanced vehicle to grid integration (VGI) applications for grid</li></ul>	<ul style="list-style-type: none"><li>• Expand the established benefits of VGI applications</li></ul>	<ul style="list-style-type: none"><li>• Demonstrate fleet PEVs that are aggregated by the fleet operator, utility, third party aggregator- emphasis on more complex where fleet PEVs are resources large enough to participate in utility CA Independent System Operator (CAISO) programs.</li><li>• Evaluate feasibility of streetlight integrated PEV charge ports</li></ul>



## Snapshot of Policy Connection and Coordination for Electric Vehicle Initiative

CEC Initiative (S9): Advance EV Infrastructure	CPUC and Other Related Activities	Avoiding Duplication
<b>Advance EV Charging to Increase Renewable Energy Levels and Improve Grid Reliability</b> <ul style="list-style-type: none"> <li>• address intermittency issues associated with renewable generation</li> </ul>	<ul style="list-style-type: none"> <li>• EO B-16-2012/ZEV Action Plan</li> <li>• Cal-ISOs VGI Roadmap</li> <li>• ZEV Mandate</li> <li>• CPUC Proceeding R1311007</li> <li>• AB 32</li> <li>• State Alternative Fuels Plan-AB 118.</li> </ul>	<ul style="list-style-type: none"> <li>• Coordinate with DOE-co funding will allow for expanded scope and expanded use of funds</li> <li>• Coordinate with AB-118 staff to ensure complementary efforts between research (EPIC) and deployment (AB 118)</li> </ul>
<b>Advance Vehicle-Grid Integration Technologies for Broader Use and Benefit for Residential/Public/Private Users.</b> <ul style="list-style-type: none"> <li>• builds on 2012-2014 IP efforts to develop the communication and protocols necessary for vehicle-grid integration</li> <li>•determine cost benefits of VGI through DR or load shifting</li> </ul>	Same as above	<ul style="list-style-type: none"> <li>• Coordinate with DOE-co funding will allow for expanded scope and expanded use of funds</li> <li>• Coordinate with AB-118 staff to ensure complementary efforts between research (EPIC) and deployment (AB 118)</li> </ul>
<b>Advance Technologies to Enable Safe and Efficient Recycling of EV Batteries.</b> <ul style="list-style-type: none"> <li>• further develop advanced tools and methods for advanced battery recycling</li> </ul>	Same as above	<ul style="list-style-type: none"> <li>• No duplication with IOU EPIC efforts.</li> <li>• Coordinate with CalRecycle to ensure project results meet CEC and CalRecycle objectives.</li> </ul>



## Snapshot of How the 2<sup>nd</sup> Plan Leverages the 1<sup>st</sup> Plan for Microgrids

Issue	1st Plan	2nd Plan
<b>Technology Demonstration and Deployment</b>	S14.2	S14
<ul style="list-style-type: none"><li>• Integrated microgrid systems composed of energy efficiency measures, DR, storage, and renewable energy resources have not been widely adopted</li><li>• Systems are complex, require specialized dedicated staff, have technological and regulatory barriers, and are only cost effective for large single owner facilities</li></ul>	<ul style="list-style-type: none"><li>• Demonstration of renewable based microgrid for reliability and to establish use cases.</li></ul>	<ul style="list-style-type: none"><li>• Demonstrate replicability of microgrids to show the value to customers of high penetration renewables, including a system of energy technologies and resources to determine best performance and least cost configuration while providing resiliency and adaptation to climate change.</li></ul>



## Snapshot of Policy Connection and Coordination for Microgrid Initiative

CEC Initiative (S14.1): Microgrid Demonstrations	CPUC and Other Related Activities	Avoiding Duplication
<p><b>Use Microgrids to Evaluate a Combination of Emerging Technologies to Determine the Best Integrated Performance and Least Cost Configuration to Meet the Customers Energy Needs</b></p> <ul style="list-style-type: none"><li>Evaluating systems of integrated energy technologies and the benefits they can provide to customers and the grid.</li><li>Determine technical and economic feasibility</li></ul>	<ul style="list-style-type: none"><li>IOU-EPIC: demonstrate the operation of utility -level distribution management controllers and interactions of equipment.</li><li>SCE and PG&amp;E: Demonstrate operation of utility level distribution management controllers capable of controlling the operation of a microgrid.</li><li>SDG&amp;E: Demonstrate interactions of equipment within a microgrid.</li><li>AB 32, SBX1-2, AB 2514, Rule 21</li></ul>	<ul style="list-style-type: none"><li>Monitor DOE and other states (Connecticut, Massachusetts, New York, New Jersey, Maryland ) on a reliability-first model</li><li>Monitor DOE-Office of Electricity Delivery and Energy Reliability on applied research for reliability in microgrid controllers and developing Best Practice manuals.</li><li>No duplication with IOU EPIC activities as CEC focus is on customer-side of the meter; however will continue to coordinate with IOUs and others with related programs</li><li>Coordinate with DOE, CPUC and other stakeholders to develop a microgrid strategic plan that will lead to a future microgrid road map.</li></ul>



## Snapshot of How the 2<sup>nd</sup> Plan Leverages the 1<sup>st</sup> Plan for Energy Storage

Issue	1st Plan	2nd Plan
	<b>Applied R&amp;D: S8</b>	<b>Technology Demo: S15.1</b>
<ul style="list-style-type: none"><li>Interconnection of energy storage systems at all grid points remains a significant challenge due to high cost and lack of appropriate communication hardware and software, and appropriate uniform standards and protocols</li></ul>	<ul style="list-style-type: none"><li>Applied Research to integrate advanced grid-level energy storage technologies and determine best use application (what works best where?)</li></ul>	<ul style="list-style-type: none"><li>Demonstrate various advanced energy storage systems and their interconnection systems to transmission, distribution, and customer side of the meter.</li></ul>



## Snapshot of Policy Connection and Coordination for Energy Storage Initiative

CEC Initiative (S15.1): Microgrid Demonstrations	CPUC and Other Related Activities	Avoiding Duplication
<p><b>Demonstrate Advanced Energy Storage Interconnection Technologies and Systems in Transmission, Distribution, and Customer-Side Applications to Transition to the Commercial Market</b></p> <ul style="list-style-type: none"><li>• Demonstrate various advanced energy storage systems and interconnection systems to transmission, distribution, and customer side of the meter.</li><li>• Determine technical and economic feasibility</li></ul>	<ul style="list-style-type: none"><li>• IOU-EPIC: Advance energy storage technologies to meet the AB2514 procurement targets; CEC focus on interconnection.</li><li>• PG&amp;E: evaluate storage on the distribution grid and inertia response emulation for distributed generation (DG) impact improvement</li><li>• SCE: demonstrate direct current (DC) fast charging and use of technological advancements to provide dynamic power conditioning</li><li>• SDG&amp;E: demonstration new distribution designs</li><li>• AB 2514 – Energy storage proceeding</li><li>• Rule 21– Interconnection, DR and resource adequacy</li></ul>	<ul style="list-style-type: none"><li>• Monitor DOE activity. DOE ARPA-E energy storage program conducts basic research and potential to feed research results into EPIC Applied Research.</li><li>• The US DOE-OE is not currently pursuing further technology and demonstrations in storage—main focus is safety issues. However will continue to monitor and coordinate.</li><li>• No duplication with IOU EPIC as IOUs focus on technologies and CEC focus is on interconnection. However, will continue to coordinate with IOUs and others with related programs.</li></ul>



# Scoping Questions for Discussion

- Purpose of discussion session:
  - allow parties and the Commission to get clarity to inform comments that respond to questions or applications
- Mechanics of discussion session:
  - Given the *set baseline and scope*, all productive discussion is invited
  - Other questions, given available time





# Broad Questions

- *(For the proposals, not the program)*
- Are proposals reasonable, consistent with the record, appropriately detailed and justified?
  - If not, how should they be modified?
  - Are there specific concerns?
  - To what extent does the matrix filed 7/28/14 address concerns?
  - Where relevant, are proposals demonstrably coordinated with CPUC mandates/proceedings





# Speakers move to mikes!





# Flexibility Questions

- *(Beyond flexibility already established)*
- What is the appropriate level of administrator flexibility?
  - Is PG&E's proposal for flexibility for funding new projects between triennial applications appropriate?
  - How can the Commission allow for it while ensuring investments are authorized?
  - What level and type of information sharing?
  - What might be the best process for allowing the proposed flexibility? Are informal avenues appropriate?
  - What does the record show?
  - How should the Commission evaluate it?





# Administrative Cost and Budget Questions

- *(Reconciling proposals with existing direction)*
- What is the appropriate method for calculating the 10 percent administrative cost cap?
  - How can the discrepancies among budget/admin numbers be resolved?
  - Were budgets reduced by accumulated interest? (D.13-11-025 p101)
  - Is there clarity about in-house/admin costs



- STEP 1:** Use Phase 2 Decision as Baseline to determine EPIC budget/collection
  - D.12-05-037, p. 73, Table 2, provides Annual EPIC Funding and Allocations for all Program Administrators:

Table 2.  
Annual EPIC Funding Collections and Allocation  
Beginning January 1, 2013 (in \$ Millions)

Funding Element	CEC	Utilities	CPUC	Total
Applied Research	\$55.0	-	-	\$55.0
Technology Demonstration and Deployment	\$45.0	\$30.0	-	\$75.0
Market Facilitation	\$15.0	-	-	\$15.0
Program Administration*	\$12.8	\$3.4	-	\$16.2
Program Oversight	-	-	\$0.8	\$0.8
<b>Total</b>	<b>\$127.8</b>	<b>\$33.4</b>	<b>\$0.8</b>	<b>\$162.0</b>

Percentage of Total Program	79%	21%	0.5%	100%
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\*Utilities' PA budget was corrected from \$3.3M to \$3.4M in D.12-07-001.

- D.12-05-037, Ordering Paragraph (OP) 5 established the EPIC Administrative Budget as 10% of the total budget and CPUC Oversight budget as .5% of the total budget.
- STEP 2:** Apply percentage allocations for IOUs (PG&E 50.1%, SCE 41.1%, SDG&E 8.8%), to determine annual collection
  - D.12-05-037, OP 7, allocates funds to the IOUs in the following percentages: PG&E 50.1%, SCE 41.1%, SDG&E 8.8%. The CEC's budget is collected and remitted by the IOUs using the allocations noted above

Annual EPIC Funding Collections and Allocations  
2015-2017 (in \$ Millions) UN-ESCALATED

	CEC	PG&E	SCE	SDG&E	Total
Utility Collection/Funding Allocation		50.1%	41.1%	8.8%	100%
Authorized EPIC Funding Collection		81.162	66.582	14.256	162.000
<b>Program Administrator Budget by Funding Element</b>					
Applied Research	55.000	0	0	0	55.000
Technology Demonstration and Deployment	45.000	15.030	12.330	2.640	75.000
Market Facilitation	15.000	0	0	0	15.000
Program Administration	12.800	1.703	1.397	0.299	16.200
Program Oversight (to be remitted to CPUC)	0	0.401	0.329	0.070	0.800
<b>Total</b>	<b>127.800</b>	<b>17.134</b>	<b>14.056</b>	<b>3.010</b>	<b>162.000</b>

IOU Total (excl. CPUC) =  
\$33.4M

- STEP 3:** Multiply Annual EPIC Funding Collections from Step 2, by 3 (to account for the 3 year cycle)

EPIC Funding Collections and Allocations 2015-2017 (in \$ Millions) UN-ESCALATED					
	CEC	PG&E	SCE	SDG&E	Total
Utility Collection/Funding Allocation		50.1%	41.1%	8.8%	100%
Authorized EPIC Funding Collection		243.486	199.746	42.7680	486.000
<b>Program Administrator Budget by Funding Element</b>					
Applied Research	165.000	0	0	0	165.000
Technology Demonstration and Deployment	135.000	45.090	36.990	7.920	225.000
Market Facilitation	45.000	0	0	0	45.000
Program Administration	38.400	5.110	4.192	0.898	48.600
Program Oversight (to be remitted to CPUC)	0	1.202	0.986	0.211	2.400
<b>Total</b>	<b>383.400</b>	<b>51.403</b>	<b>42.169</b>	<b>9.029</b>	<b>486.000</b>

- STEP 4:** Apply 2.44% Escalation (7.5% Compounded) as a preliminary estimate, pursuant to OP 7 of D.12-05-037 [1]
  - OP 7 states, the total collection amount shall be adjusted on January 1, 2015 and January 1, 2018 commensurate with the average change in the Consumer Price Index...

EPIC Funding Collections and Allocations 2015-2017 (in \$ Millions) ESCALATED					
	CEC	PG&E	SCE	SDG&E	Total
Utility Collection/Funding Allocation		50.1%	41.1%	8.8%	100%
Authorized EPIC Funding Collection		261.747	214.727	45.9756	522.450
<b>Program Administrator Budget by Funding Element</b>					
Applied Research	177.375	0	0	0	177.375
Technology Demonstration and Deployment	145.125	48.472	39.764	8.514	241.875
Market Facilitation	48.375	0	0	0	48.375
Program Administration	41.280	5.493	4.507	0.965	52.245
Program Oversight (to be remitted to CPUC)	0	1.293	1.060	0.227	2.580
<b>Total</b>	<b>412.155</b>	<b>55.258</b>	<b>45.331</b>	<b>9.706</b>	<b>522.450</b>

- Note – Escalated totals appear on page 71 of PG&E Investment Plan
- [1] 2.44% escalation rate is PG&E's preliminary estimate and may subsequently be adjusted



# Coordination and Non-duplication Questions

- *(For the proposals, not the program)*
- Do administrators demonstrate EPIC work is coordinated and avoids unnecessary duplication?
  - To what extent does the matrix address this question?
  - What are specific concerns?





# Leveraging Prior Plan Questions

- *(Beyond administrator due diligence; questions posed by timelines)*
- Do the 2015-2017 proposals leverage the work approved in the 2012-2014 plans?
  - How should the Commission evaluate this?
  - ...Especially in cases where previous decisions said results from EPIC 1 would be the guide?





# Intellectual Property

- How should the Commission clarify EPIC IP terms?
  - Are proposed IP terms reasonable?
  - How should the Commission clarify areas identified by SCE?
  - How should the Commission evaluate costs and benefits of administrator ownership of IP?
  - What IP clarifications are needed?





# Any other clarifying questions?

- NSHP proposal clarity?





**Thank you!**  
**For Additional Information:**

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**<http://www.cpuc.ca.gov/PUC/energy/Climate+Change/research+and+development.htm>**

“Research is creative work undertaken on a systematic basis in order to increase the stock of knowledge and solve problems”

